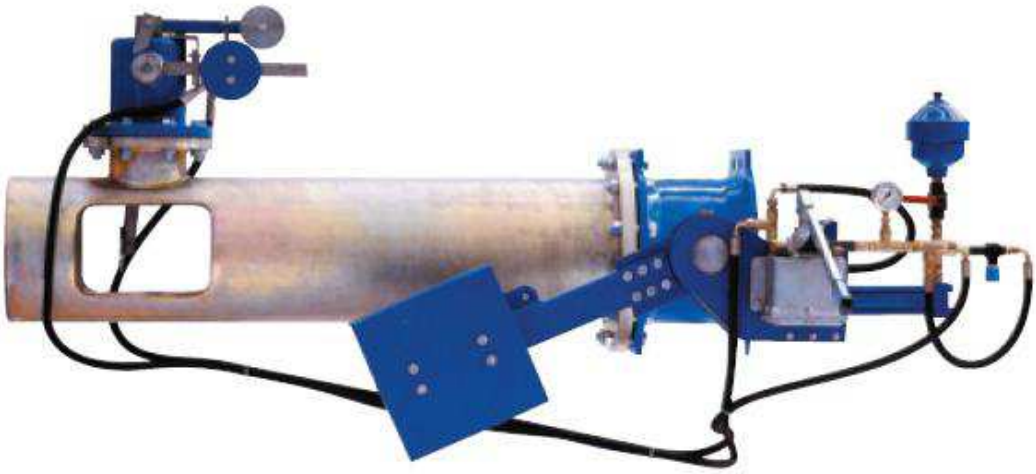
OPERATION AND MAINTENANCE

INSTRUCTIONS

EUROSTOP SAFETY BUTTERFLY VALVE



INDEX

1 STORAGE INSTRUCTIONS

1.1 HANDLING

The handling of the valves has to be made with care, in order to avoid any shock, even accidental, which could damage the valves and the coating. In particular the lifting of the valve should be carried out paying attention that the chains, cables or ropes used for that specific operation do not damage the maneuver system. For this task the ends of the valve body or the flanges should be used.
Use only lifting equipments and devices (as i.e. metallic ropes) suitable to lift and handle to lay on site and then dismantle the valves and their le accessories (gearboxes, actuators, etc)

1.2 STORAGE

Generally the valves are supplied in pallets banded with plastic film; if the valves are without packing and have to stay for long time in the stock before being installed, they shall be stocked plugging up every opening in direct contact with the inner workings of the valve, safeguarding in this way the interior parts and particularly the seat from the contact with powder or dirt.

The valves shall be stored in a location offering a good protection against direct sun, the rain and all other atmospheric elements (admissible storage temperature. -20°C to +70°C). The rubber components are sensitive to the light and the sunbeam. In absence of a storage place the valves have to be wrapped with a cellophane or plastic sheet, possibly of dark color.

Do not leave the valve completely closed and do not protrude the disc out of the body of the valve.

1.3 OLEODYNAMIC ACTUATOR STORAGE

The oleo-dynamic actuator is supplied already mounted on the valve with separate counterweight and arm in only one package.

It's advised to control that the seats of threaded connections needed for the electrical and/or hydraulic/pneumatic connections, have to be always protected till when they will be connected. This in order to avoid the contact between the interior components (gears, arms, cylinders, etc) with powder, dirt, water or something that can damage them.

In case the oleo-dynamic connection would not be made immediately after the valve mounting, the customer has to protect the actuator (with adequate protections) against the atmospheric elements and condensates formations.
The conservation status of the internal components has to be checked monthly, opening the control group's covers and the terminal board, protecting them with silicone or vaseline oil before closing.

2 INSTALLATION INSTRUCTIONS

2.1 PRELIMINARY INSPECTION

Before making any mounting operation make sure that the valves' body and particularly the valve's seat are free of dust, dirt or external particles.
Please always check before the installation that all the clamping screws of the components, both internal and external are perfectly tighten and if not proceed fixing them.

At least one complete cycle of opening/closing of the valve has always to be made preliminarily in order to check that all the valve's components are working correctly.

2.2 MOUNTING

The safety butterfly valve EUROSTOP can be supplied in three different configurations:

- valve with paddle, oleo-dynamic actuator and manual resetting pump;
- valve with paddle, oleo-dynamic actuator and electric resetting unit;
- valve with oleo-dynamic actuator and electric resetting unit.

The mounting of every valve has to be made without pressure in the pipeline. It's fundamental to keep sufficient space around the valves to permit every monoeuvre operation, and any eventual future setting or maintenance work.

We strongly suggest installing a dismantling joint in downstream of the valve. Thanks to its adjustable length there is no more need of a very precise mounting between the pipe flanges. In fact it allows in case of necessity to check the internal status of the seat and if needed to change the seat ring of the valve without taking it out of the pipe.

The valves shall be mounted with the rotation disc axis in horizontal position.
The oleo-dynamic actuator is normally installed on the right side of the valve and the counterweight closes towards upstream. In case of a different configuration the requested mounting way has to be respected.
In the EUROSTOP safety butterfly valves with paddle and speed detector, its mounting way foresees an upstream paddle installation.

The pipeline must be kept as clean as possible from impurities like welding dust, scraps, mounting accessories, dirt etc.
If there is dirt in the water it is strongly suggested to fit a filter upstream of the valve.

The coupling flanges on the pipe have to be perfectly lined up and parallel and the gaskets have to be without defects. In case the dismantling joint is not used, the distance between the pipe's flanges has to be the same of the valve's gauge including the gaskets. A wrong measurement or alignment could damage the valve's body, because of the tension caused during the tightening of the flanges with the bolts.
Gradually tighten the nuts, alternating diagonally between nuts, until the finally torque is reached.

In case of the EUROSTOP safety valve with paddle and manual resetting pump, the two flexible pipes have to be connected between the speed detector and the oil tank on the actuator. The standard pipes dimension of the oleo dynamic circuit is of 3/8", the length depends on the diameter.

In case of the EUROSTOP safety valve with electric resetting unit (with or without paddle), the oil and the flexible pipes are not included. The supply excludes even the electric wirings (for example the electrical wirings between the limit switch and the actuator and the electrical board alimentation), while the electrical board is already wired.

Every EUROSTOP safety valve configuration is provided with 2 on/off end switches for the remote control. Upon request more than 2 end switches can be installed.
In case of a connection with an electrical resetting unit please follow the electrical unit manual.

NOTE: For possible future interventions on the internal parts of the valves it is strongly recommended laying every actuated (or to be actuated) valve together with a dismantling joint. Please consult Saint-Gobain PAM for these products.

2.3 START UP

After the mounting of the valves on the pipeline it must be verified that the coating has not been damaged, in that case repair the coating (follow the technical sheets and the material sheets) to avoid rust formations.

3 INSTALLATION INSTRUCTIONS

3.1 OPENING/CLOSING MANOEUVRE

The valve closing is actuated by the counterweight, moved by an oleo dynamic cylinder. The closing happens taking off the pressure by the oleo dynamic circuit, consequently the counterweight falls and the valve closes.
In case of the safety valve with paddle and manual resetting pump, is foreseen a control valve (8) which, opportunely calibrated, (it) control the speed closure of the valve, regulating the unloaded of the oil from the oleo-dynamic cylinder (2) and the accumulator (9).

3.1.1 MANOEUVRE WITH PADDLE, OLEO-DYNAMIC ACTUATOR AND MANUAL RESETTING PUMP

Please take the drawing in figure 1 as a reference
In this case the safety valve closing and opening operations have to be made through the rearmament with the manual pump
Close to the pump there are:

- n.1 oil pressure gauge (5),
- n.1 check valve (7),
- n.1 ball valve to hold closed, in order to avoid the return of the oil to the mount of pump,
- n.1 valve of maximum pressure (11) for the oil discharge in the tank (10), in case of pressures that exceed in value the maximum rating permitted in the circuit.

VALVE OPENING (FILLING PHASE)
To charge the oleo dynamic circuit and to permit the opening of the valve by the counterweight lifting effect, follow these instructions.
First of all the speed detector's counterweight has to be hooked on the cam (3) in order to close the oleo-dynamic circuit. This operation has to be carried out manually.
The oil comes out from the tank (10) and goes to the oleo-dynamic circuit by the manual pump; the tank volume changes according to the DN.
The oil, passing by the *node B*, fills up the *pipe n.1* till the oleo-dynamic valve which is connected to the speed detector (3); the oil cannot return to the pump by the check valve (7). In these conditions the oil passage by the *pipe n. 2* is not possible, because the circuit is closed.
The oil by the *node B* goes to fill up even the oleo-dynamic cylinder (2) and accumulator (9).
The passage from the oleo-dynamic cylinder filling phase to the accumulator filling phase is characterized by a remarkable increase of pressure (visible on the gauge) and consequently it is necessary to apply a higher force to the pump lever.
The accumulator is used to maintain always a constant pressure in the oleo-dynamic circuit in order to avoid, in case of oil blow by, the possibility of an oleo-dynamic actuator counterweight drop in, with the consequent closing of the valve; therefore the accumulator is an additional guarantee for the customer to have the oleo dynamic circuit always in pressure.
The ball valve (4) of the accumulator normally is open; if there is necessity to isolate the accumulator it can be closed.

VALVE CLOSING (DISCHARGE PHASE)

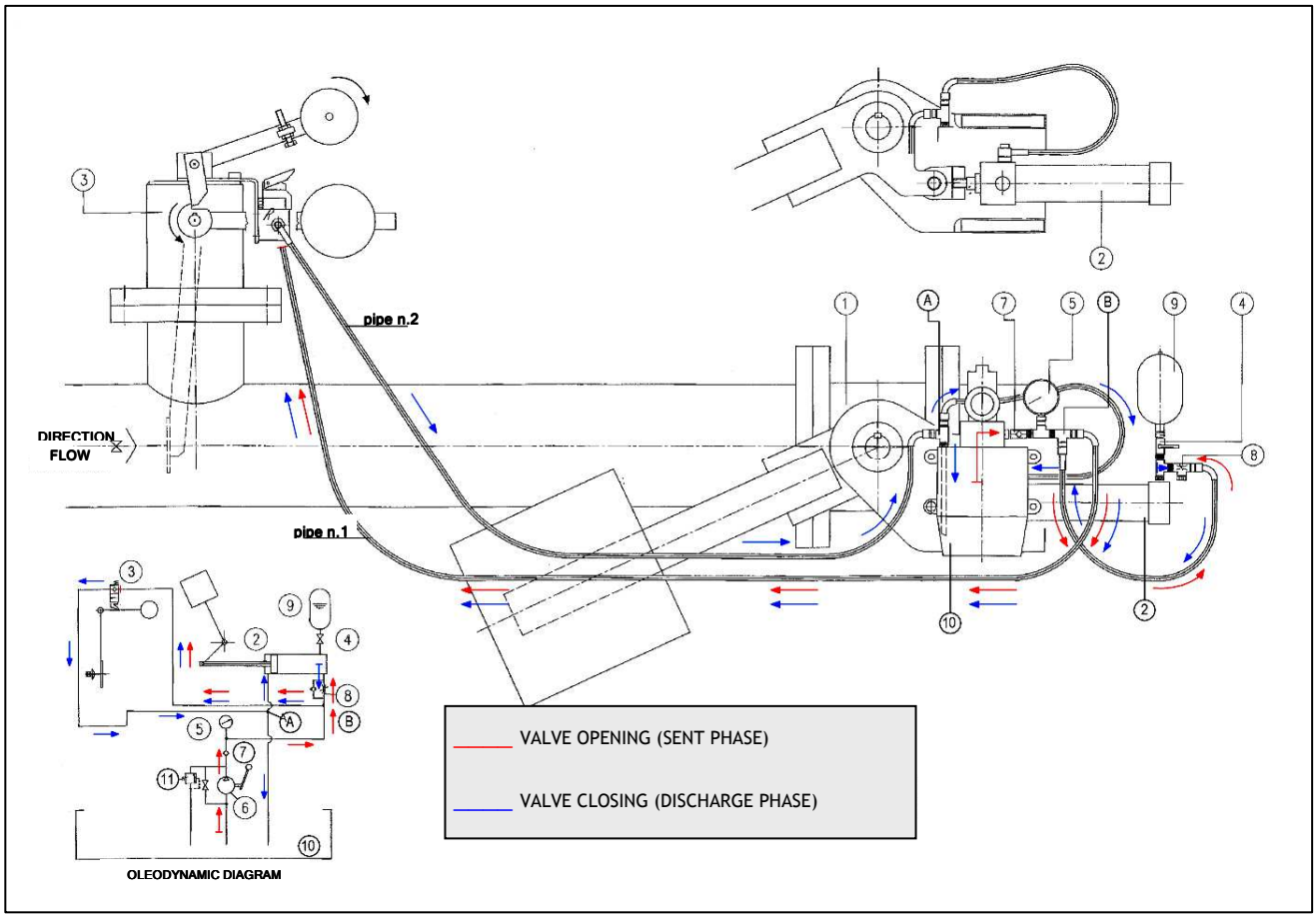
When the velocity in the pipeline goes over the set point, the water push on the paddle proportional to the square of the speed, steps in operating the release of the counterweight mechanism connected to the paddle by the cam's rotation.

By the rotation effect the counterweight falls and it pushes the oleo-dynamic valve switch, opening the circuit and discharging the oil from the cylinder.

Consequently the oil in the circuit begins to flow away trough the *pipe n.2* emptying gradually the piston, the accumulator and the *pipe n.1* (attention, the oil cannot come back towards the pump thanks to the check valve (7), and it does not even come back trough the *pipe n.1* thanks to the presence of the check valve into the speed detector). From the *pipe n.2* trough the *A node*, the greatest part of the oil is discharged in the tank while a little part goes to fill up the front part of the oleo-dynamic cylinder in order to avoid oxidation problems caused by the contact of the internal parts with the air.

With the oil discharge in the tank the counterweight falls thanks to the oleo-dynamic cylinder movement and consequently the valve gets closed.

The regulation valve (8, opportunely calibrated, controls the speed of the oil from the cylinder to the accumulator and to the tank. Additionally to the control valve, sometimes it could be installed even a check valve that permits an easier passing of the oil from the tank to the accumulator during the charging phase, mainly if the control valve is set at a slow speed;



Ref.	Description
1	Butterfly valve
2	Oleo-dynamic cylinder
3	Speed detector
4	Ball valve
5	Gauge
6	Manual pomp
7	Check valve
8	Control valve
9	Accumulator
10	Oil tank
11	Valve of maximum pressure

3.1.2 MANOEUVRE WITH PADDLE, OLEODYNAMIC ACTUATOR AND ELECTRIC RESETTING UNIT

Please take the drawing in figure 1 as a reference
Respect to the previous configuration, the safety butterfly valve with paddle, the oleo-dynamic actuator and the electric resetting pump are characterized by an automatic resetting through an electric unit.

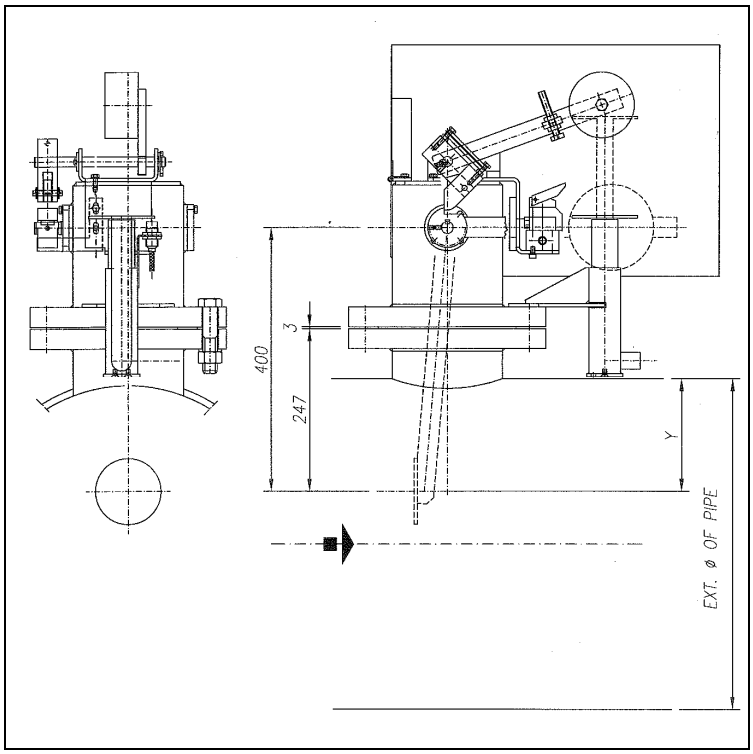


Figure 2 – Detail of the oleo-dynamic resetting cylinder for the safety butterfly valve Eurostop with paddle, oleo-dynamic actuator and electric resetting unit

VALVE OPENING (FILLING PHASE)

The pump 0P01 activated by the M motor allows to keep a constant oil value pressure in the circuit, the type of motor and pump changes according to the diameter of the pipeline.

The compensating valve 0V02 keeps constant the filling oil pressure, discharging the excess of oil in the tank; the tank is dimensioned in according to the DN.

The valve 0V02 regulates the opening speed of main valve: if the opening's degree of the valve 0V02 changes, the flow rate of oil discharged in the tank is modified, obtaining the variation of the oil flow rate from the pump to the cylinder with a consequent reduction/increase of the opening speed of the main valve (opening the valve 0V02, the opening speed of the main valve slows down).

At the beginning the solenoid valve 0V04 is closed, while the solenoid valve 0V07 feeds the cylinder 0A01 (equipped by a spring) that resets the speed control unit (paddle) trough the rising of its balance weight.

When the resetting has finished with the closure of the cam valve 0V08, the valve 0V04 opens and feeds the oleo-dynamic cylinder 0A02, allowing the rising of the related balance weight.

During the normal working condition, the valve 0V03 and the solenoid valve 0V05 remain closed:

- 0V05 is a releasing solenoid valve controlled from a remote-control through a solenoid which allows the closing at the distance of the butterfly valve; its opening in fact (without considering the paddle and the cam valve) determines the discharge of the oil to the tank with the consequent lowering of the balance weight of the oleo dynamic cylinder and the closure of the valve;
- 0V03 is a valve of maximum pressure which is normally installed in order to work when the maximum pressure switch doesn't work; in this case, with pressure values higher than the maximum value allowed, 0V03 opens and allows the discharge of the oil in the tank;
- 0S03 and 0S04 allow to control the minimum and maximum values of pressure (if the pressure goes below the minimum value the pump reacts to reset the right values)

When the maximum pressure is reached, detached by the maximum pressure switch, the engine which feeds the pump stops, the solenoid valve 0V04 closes and the oil still present in the cylinder 0A01 is discharged in the tank so that the cylinder comes back to the beginning position.

In this condition the safety butterfly valve is open.

VALVE CLOSING (DISCHARGE PHASE)

Also in this case, the closing of the valve happens when in the pipeline the speed of the water reaches the maximum value and determines the acting of the paddle with consequent release of the balance weight from the cam valve 0V08. The opening of the valve 0V08 determines the discharge of the oil in the tank.

The closing, without the mechanical participation of the paddle which stresses the solenoid valve 0V07, can be also obtained at the distance through the activation of the solenoid valve 0V05, as described above.

In both cases the valve closing speed, and so the lowering speed of the balance weight too, is regulated with a flow regulation valve 0V09.

Consider that a resetting manual pump 0P02 is always installed to be used if the electric unit doesn't work.

For further information see the electric unit manual.

The solenoid valve 0V05 is supplied normally open (N.O.) in the standard version: in this version the solenoid valve 0V05 opens causing the oil discharge in the tank and the main valve closure when the power shuts off. On request the solenoid valve 0V05 can be supplied normally closed (N.C.).

The working described above can change according to the configuration requested by the customer.

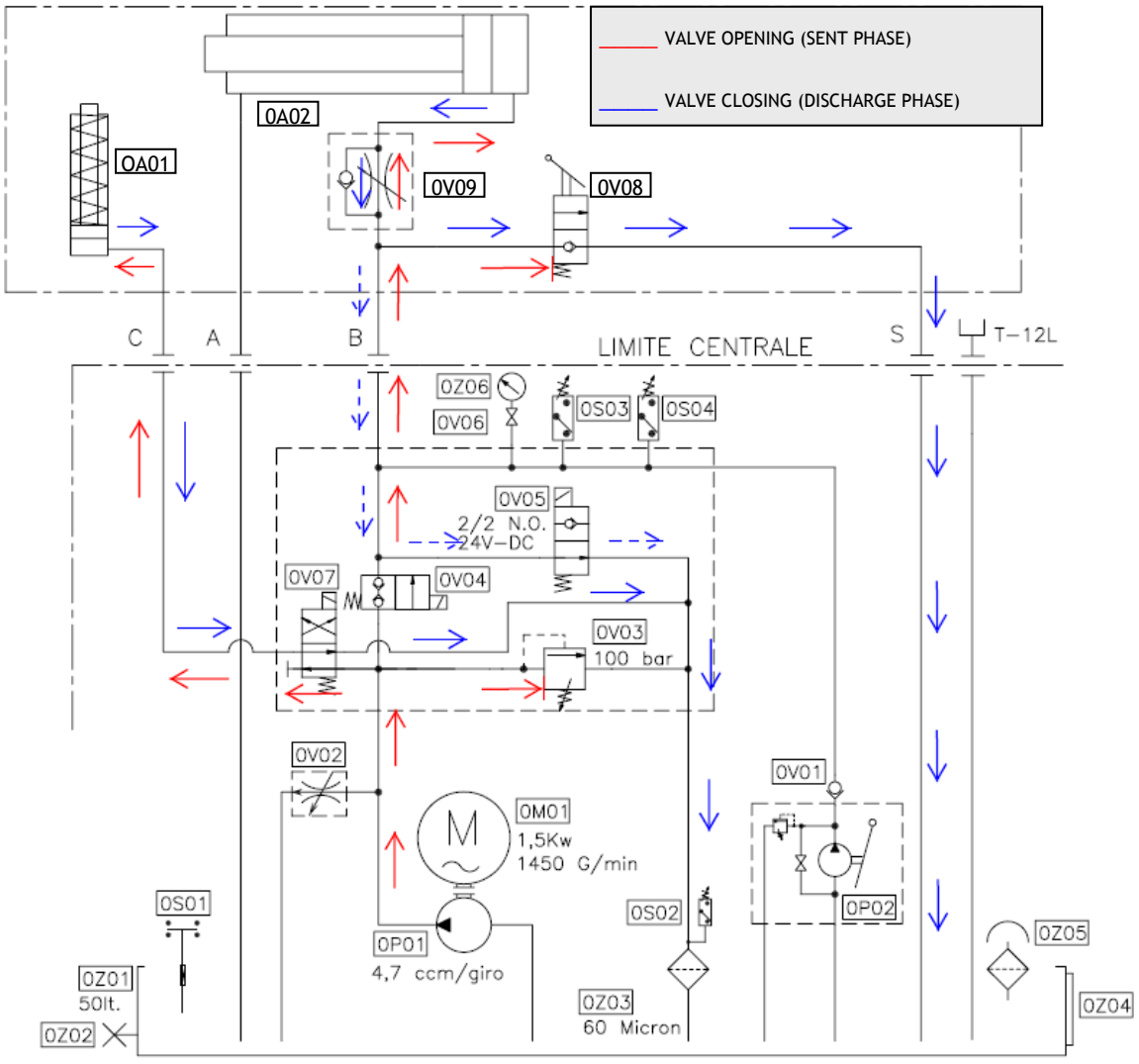


Figure 3 – Working drawing for the safety butterfly valve Eurostop with paddle, oleo dynamic actuator and electric resetting pump

Ref.	Description	Ref.	Description
0A02	Oleo dynamic cylinder	0V03	Max pressure valve
0A01	Oleo dynamic cylinder	0V02	Compensated flow control valve
0S04	Pressure switch	0V01	Check valve (one way)
0S03	Pressure switch	0Z06	Manometer
0S02	Obstruction indicator	0Z05	Charging cap
0S01	Electric level indicator	0Z04	Visual level
0V09	Flow regulating valve	0Z03	Filter
0V08	Cam valve	0Z02	Discharging cap
0V07	Solenoid valve	0Z01	Tank
0V06	Exclusion switch	0P02	Manual pump
0V05	Solenoid valve	0P01	Motorized pump
0V04	Solenoid valve	0M01	Electric engine

3.1.3 MANOEUVRE WITH OLEODYNAMIC ACTUATOR AND ELECTRIC RESETTING UNIT

The valve with oleo-dynamic actuator and electric resetting pump, without paddle, has the same working drawing as the one described in the paragraph 3.1.2. The only difference is that the opening and the closure of the valve are not controlled through the paddle but only through an solenoid valve controlled at distance by solenoid valve (0V05).

VALVE OPENING (FILLING PHASE)
The pump 0P01 activated by the M motor allows to keep a constant oil value pressure in the circuit, the type of motor and pump changes according to the diameter of the pipeline.
The compensating valve 0V02 keeps constant the filling oil pressure, discharging the excess of oil in the tank; the tank is dimensioned in according to the DN.
The valve 0V02 regulates the opening speed of main valve: if the opening's degree of the valve 0V02 changes, the flow rate of oil discharged in the tank is modified, obtaining the variation of the oil flow rate from the pump to the cylinder with a consequent reduction/increase of the opening speed of the main valve (opening the valve 0V02, the opening speed of the main valve slows down).
The cylinder 0A01 is fed through the unidirectional valve 0V04, allowing the rising of the related balance weight.
During the normal working condition, the valve 0V03 and the solenoid valve 0V05 remain closed:

- 0V05 is a releasing solenoid valve controlled from a remote-control through a solenoid which allows the closing at the distance of the butterfly valve; its opening in fact determines the discharge of the oil to the tank with the consequent lowering of the balance weight of the oleo dynamic cylinder and the closure of the valve;
- 0V03 is a valve of maximum pressure which is normally installed in order to work when the maximum pressure switch doesn't work; in this case, with pressure values higher than the maximum value allowed, 0V03 opens and allows the discharge of the oil in the tank;
- 0S03 and 0S04 allow to control the minimum and maximum values of pressure (if the pressure goes below the minimum value the pump reacts to reset the right values)

When the maximum pressure is reached and detached by the maximum pressure switch, the engine which feeds the pump stops.
In this condition the safety butterfly valve is open.

VALVE CLOSING (DISCHARGE PHASE)
The closing is obtained at the distance through the activation of the solenoid valve 0V05, as described above.
The valve closing speed, and so the lowering speed of the balance weight too, is regulated with a flow regulation valve 0V08.
Consider that a resetting manual pump 0P02 is always installed to be used if the electric unit doesn't work.

For further information see the electric unit manual.

The solenoid valve 0V05 is supplied normally open (N.O.) in the standard version: in this version the solenoid valve 0V05 opens causing the oil discharge in the tank and the main valve closure when the power shuts off. On request the solenoid valve 0V05 can be supplied normally closed (N.C.).
The working described above can change according to the configuration requested by the customer.

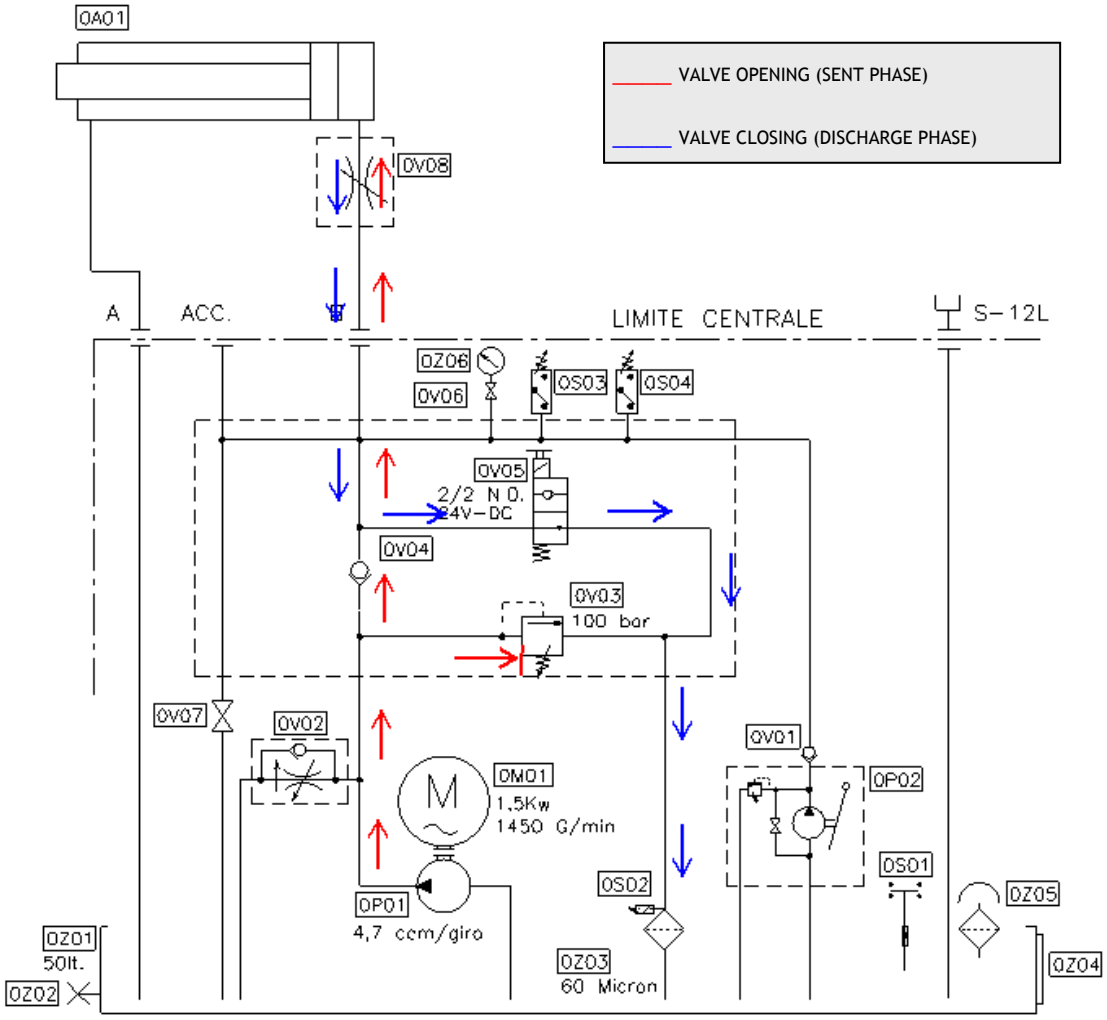


Figure 4 – Working drawing for the safety butterfly valve Eurostop with oleo dynamic actuator and electric resetting pump and without paddle

Ref.	Description	Ref.	Description
0A01	Oleo dynamic cylinder	0V02	Flow regulating valve
0S04	Pressure switch	0V01	Check valve (one way)
0S03	Pressure switch	0Z06	Manometer
0S02	Pressure switch	0Z05	Charging cap
0S01	Electric level indicator	0Z04	Visual level
0V08	Flow regulating valve	0Z03	Filter
0V07	Ball valve	0Z01	Tank
0V06	Exclusion switch	0P02	Manual pump
0V05	Solenoid valve	0P01	Motorized pump
0V04	Check valve (one way)	0M01	Electric engine
0V03	Max pressure valve		

3.2 SERVICE CONDITIONS

The standard UNI EN 1074-1-2 fixes the maximum speed of water in the valve:

PFA (bar)	10	16	25
Max speed of water (m/s)	3	4	5

The same standard fixes also the admissible temperature of water: from 0°C (excluded freezing) to 50°C.
The butterfly valve is an isolating device, so it's designed to work completely closed or open.

4 MAINTENANCE INSTRUCTIONS

4.1 ORDINARY MAINTENANCE

The butterfly valves EUROSTOP are designed, manufactured and tested to guarantee the maximum liability and endurance. In the standard version the choosing of materials is made paying attention to usual type of fluid and the common exercise condition: all the parts subjected to wear are perfectly self-lubricated and does not necessitate of particularly maintenance.

The efficiency of hydraulic equipments during their life is generally connected to the exercise conditions and to the type of fluid. It's advised to plan periodical inspection according to the type of valve and to the main function of the same valve.

For the butterfly valves, to maintain the performances in the time, it's needed to do at less one complete cycle of opening/closing manoeuvre every year to reduce incrustations and sediments that can accumulate during the exercise.
If the butterfly it's used also to regulate the flow, it's necessary to verify periodically the conditions of body and seat.

Year / Operation	1	2	3	4	5	After 5 years
Release simulation (op. – cl.)	yes	yes	yes	yes	yes	One cycle every year
Verify the clamping of bolts of flanges and gearbox	yes	yes	yes	yes	yes	Control at every inspection
Verify seat and body (if the valve is used for regulation)	yes	yes	yes	yes	yes	Control at every inspection

RELEASE SIMULATION
The correct working of the valve can be verified also without its complete closing, but by a partial closing, obtained by the counterweight rotation also of little degrees.
The controlled rotation can be carried out in various ways:

- in case of EUROSTOP safety butterfly valves with paddle, oleo-dynamic actuator and manual resetting pump/electric resetting unit:
  - to press on the push-button of the oleo-dynamic valve (the one on which the counterweight set in action from the paddle in closing phase), so as to have a controlled oil discharge in the tank

- to use blocking chains on the counterweight of the oleo-dynamic actuator (so as to limit the spin of the counterweight to little degrees), to manually release the counterweight of speed detector by the cam rotation.

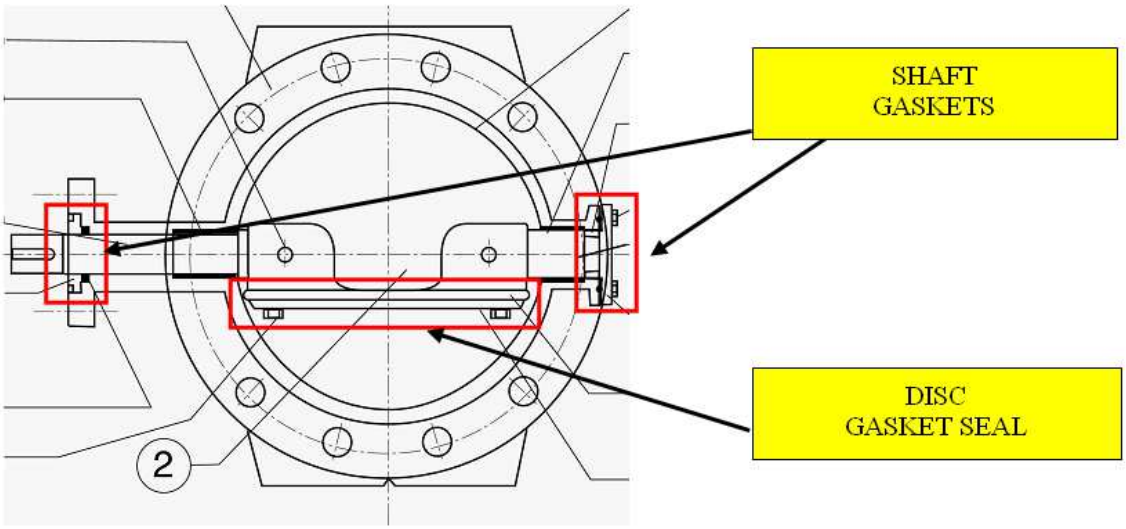
- in case of EUROSTOP safety butterfly valves with or without paddle, with oleo-dynamic actuator and electric resetting unit:
  - to activate the solenoid valve 0V05 from far, concurring the partial closing of the butterfly valve.

In any case, completed the simulation, it will be necessary to pump oil in the circuit to reset the initial conditions (valve completely opened).

4.2 EXTRAORDINARY MAINTENANCE

In presence of particular exercise conditions (not filtered or particularly aggressive water, incrustations) or damage due to external cause, it's possible that operations of extraordinary maintenance are needed.
These operations of extraordinary maintenance that can be made directly on site are the replacement of disc gasket seal and the replacement of shaft gaskets. Other operations (replacement of the disc, shaft …) are very exceptional and are not explained in this manual (in any case they are possible contacting our technical department).

All these operations have to be effectuated after the complete emptying of the pipe (total absence of pressure) to avoid any risk to the people during this operations.
Remember to remove gradually the bolts only after the clamping of the valve lifting device.



4.3 TABLE FOR SUGGESTED OILS

The suggested oils for the tank of the oleodynamic actuator are the following.
The use of other oils different than these ones do not guarantee the expected functionality.

Produttore / Manufacturer	Tipo / Type					
ISO Visk. Kl. / ISO Visc. Grad / DIN 51519		VG22	VG32	VG46	VG68	VG100
AGIP	HLP		OSO32	OSO46	OSO68	OSO100
AGIP	HV	ARNICA22		ARNICA46		
ARAL	HLP	VITAM GF 22	VITAM GF 32	VITAM GF 46	VITAM GF 68	VITAM GF 100
ARAL	HV		VITAM HF 32	VITAM HF 46		
AVIA	HLP	AVILUB RSL 22	AVILUB RSL 32	AVILUB RSL 46	AVILUB RSL 68	AVILUB RSL 100
AVIA	HV		AVILUB HVI 32	AVILUB HVI 46	AVILUB HVI 68	
BP	HLP	ENERGOL HLP 22	ENERGOL HLP 32	ENERGOL HLP 46	ENERGOL HLP 68	ENERGOL HLP 100
BP	HV	BARTRAN HV 22	BARTRAN HV 32	BARTRAN HV 46	BARTRAN HV 68	BARTRAN HV 100
BRENNTAG	HLP	HLP 22	HLP 32	HLP 46	HLP 68	HLP 100
CASTROL	HLP	HYSPIN AWS 22	HYSPIN AWS 32	HYSPIN AWS 46	HYSPIN AWS 68	HYSPIN AWS 100
CASTROL	HV		HYSPIN AWH 32	HYSPIN AWH 46	HYSPIN AWH 68	
CHEVRON	HLP	EP HYDR. OIL 22	EP HYDR. OIL 32	EP HYDR. OIL 46	EP HYDR. OIL 68	EP HYDR. OIL 100
CHEVRON	HV		EP HYDR. OIL 32 HV	EP HYDR. OIL 46 HV	EP HYDR. OIL 68 HV	
DEFROL	HLP	HLP 22	HLP 32	HLP 46	HLP 68	HLP 100
ELF	HLP	ELFOLNA 22	ELFOLNA 32	ELFOLNA 46	ELFOLNA 68	ELFOLNA 100
ELF	HV	HYDRELF 22	HYDRELF 32	HYDRELF 46	HYDRELF 68	
ESSO	HLP	NUTO H 22	NUTO H 32	NUTO H 46	NUTO H 68	NUTO H 100
ESSO	HV	UNIVIS N 22	UNIVIS N 32	UNIVIS N 46	UNIVIS N 68	UNIVIS N 100
FINA	HLP	HYDRAN 22	HYDRAN 32	HYDRAN 46	HYDRAN 68	HYDRAN 100
FINA	HV	HYDRAN HV 22	HYDRAN HV 32	HYDRAN HV 46	HYDRAN HV 68	
FINKE	HLP	AVIATICON HY-07	AVIATICON HY-10	AVIATICON HY-20	AVIATICON HY-30	AVIATICON HY-50
FUCHS	HLP	RENOLIN B 5	RENOLIN B 10	RENOLIN B 15	RENOLIN B 20	RENOLIN B 30
FUCHS	HV		RENOLIN MR 32 HV	RENOLIN MR 46 HV	RENOLIN MR 68 HV	
GULF	HLP		MECHANISM LPS 32	MECHANISM LPS 46	MECHANISM LPS 68	MECHANISM LPS 100
LD LUBRICATING	HLP	LD HLP 22	LD HLP 32	LD HLP 46	LD HLP 68	LD HLP 100
LD LUBRICATING	HV		LD HVI 32	LD HVI 46	LD HVI 68	
MOBIL	HLP	DTE 22	DTE 24	DTE 25	DTE 26	DTE 27
MOBIL	HV		DTE 13	DTE 15	DTE 16	DTE 18
OEMV	HLP	HLP 22	HLP 32	HLP 46	HLP 68	
OEMV	HV		HLP-M 32	HLP-M 46		
OPTIMOL	HLP	HYDO 5025	HYDO 5035	HYDO 5045	HYDO 5065	HYDO 5095
OPTIMOL	HV		HYDO MV 5035	HYDO MV 5045	HYDO MV 5065	
SHELL	HLP	TELLUS ÖL 22	TELLUS ÖL 32	TELLUS ÖL 46	TELLUS ÖL 68	TELLUS ÖL 100
SHELL	HV		TELLUS ÖL T 32	TELLUS ÖL T 46 HYDROL HV 46	TELLUS ÖL T 68	TELLUS ÖL T 100
TEXACO	HLP	ALCOR OIL DD22	ALCOR OIL DD32	ALCOR OIL DD46	ALCOR OIL DD68	ALCOR OIL DD100
TEXACO	HV		RANDO OIL HD AZ32	RANDO OIL DD-Z 46	RANDO OIL HD CZ 68	
TOTAL	HLP	AZOLLA ZS 22	AZOLLA ZS 32	AZOLLA ZS 46	AZOLLA ZS 68	AZOLLA ZS 100
TOTAL	HV		EQUIVIS ZS 32	EQUIVIS ZS 46	EQUIVIS ZS 68	
VALVOLINE	HLP	ETC 20	ETC 25	ETC 30	ETC 35	
VEEDOL	HLP	ANDARIN 22		ANDARIN 46	ANDARIN 68	ANDARIN 100

4.4 OTHER INTERVENTIONS

4.4.1 DISC GASKET SEAL REPLACEMENT

Please refer to the technical data sheet of spare parts for details.

4.4.2 SHAFT GASKETS REPLACEMENT

Please refer to the technical data sheet of spare parts for details.

4.4.3 OLEODYNAMIC COMPONENTS ACTUATOR REPLACEMENT

For the complexity of the operations it is advised to contact Saint-Gobain PAM Technical Department.

NOTE

For any further information or clarification consult Saint - Gobain PAM .